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ABSTRACT OF THE DISCLOSURE

This invention provides method and apparatus for fabricating a MEMS apparatus having a bulk element with hinges underneath. The bulk element may comprise single-crystal silicon, fabricated by way of bulk micromachining techniques. The hinges may be
5 made of thin-films, fabricated by way of surface micromachining techniques. A distinct feature of the MEMS apparatus of the present invention is that by disposing the hinges underneath the bulk element, the surface of the bulk element can be maximized and the entire surface becomes usable (e.g., for optical beam manipulation). Such a feature would be highly advantageous in making arrayed MEMS devices, such as an array of MEMS mirrors
10 with a high optical fill factor. Further, by advantageously making use of both bulk and surface micromachining techniques, a MEMS mirror thus produced is equipped with a large and flat mirror along with flexible hinges, hence capable of achieving a substantial rotational range at modest electrostatic drive voltages.